

2. Examine Mortality and Recovery Rates

a. Analyze the relationship between confirmed cases, deaths, and recoveries to understand regional fatality and recovery rates.

Observation Month	Africa Region Confirmed Cases	Deaths in Africa Region	Recoveries in Africa Region	Deaths in Africa Region %	Recoveries in Africa Region %
February	2	0	0	0.000000	0.000000
March	5233	224	154	4.280527	2.942863
April	98647	4469	15316	4.530295	15.526068
May	468506	14919	169391	3.184378	36.155567
June	265319	8964	129945	3.378574	48.976892

The table above shows the trend in deaths and recoveries in the African region over the course of five month (February - June 2020)

The table above shows that the pandemic did not spread to the Africa region early as there were no recorded cases in January, and even almost no cases in February. This was not the cases in other countries, especially countries in the East Asia region, which had encountered the pandemic as early as late December 2019 - early January 2020. The pandemic escalated starting from the month of March with a few thousands cases reported to almost a hundred thousand, and it peaked at 468,506 cases in May. Commendable enough, the death rate for the Africa region decreased over time, even though in low values, even with the surge of the confirmed cases. The recovery rate of the Africa region was even more impressive, as it went from 2% in its thousands of cases to 48% in its few hundred thousands of cases. It can be said that the pandemic was well handled in the African region, which can most likely be attributed to the late and low spread of the disease to the region.

Observation Month	Europe Region Confirmed Cases	Deaths in Europe Region	Recoveries in Europe Region	Deaths in Europe Region %	Recoveries in Europe Region %
January	34	0	0	0.000000	0.000000
February	4679	121	363	2.586023	7.758068
March	1814981	147415	201456	8.122124	11.099620
April	12160964	1538324	2339742	12.649688	19.239774
May	20107275	2886032	5884999	14.353173	29.268009
June	7224005	1037670	2466662	14.364193	34.145353

The table above shows the trend in deaths and recoveries in the African region over the course of six month (January - June 2020)

From the table above, it can be seen, that unlike the last African region, the incidence of the pandemic was witnessed earlier, and at a higher level of magnitude. As at early as at March, almost a million cases had been reported, and the pandemic peaked similarly to the last region in the month of May with over 20 million cases. The death rate however, increased throughout that period, averaging almost over a 10% value and peaking at a value of 14.36% in the month of June. This resulted in deaths in millions over the months of April to June. The recovery rate was moderate in the region it increases from a value of 7-34% in over the months. For confirmed cases in their tens of millions, this was not a commendable response of the European countries to the pandemic, it was handled poorly, it can most likely attributed to the high rate of spread and breakout of the disease in the region.

b. Compare mortality and recovery rates between countries or regions to determine which areas were more severely impacted by Covid-19.

	Confirmed	Deaths	Recovered	Percent Deaths	Percent Recoveries
Africa Region	837707	28576	314806	2.910000	38.880000
North America Region	92110216	5371511	19379517	7.740000	43.779999
Central America Region	4708553	95255	1980559	2.780000	30.320000
East Asia and Oceania	12542623	517871	9439850	2.910000	66.430000
Europe	41311938	5609562	10893222	11.470000	36.459999
Middle East Asia Region	17642530	710076	11384043	3.830000	57.630000
Asia Region	7968659	293828	3011266	4.290000	40.080000

The table above shows the trend in cases, deaths and recoveries in all regions over the course of 6 months (January - June 2020)

The table above shows how the pandemic progressed across all regions in the the first six months of the year of 2020. The trend of the pandemic progressed in three patterns across all regions :

1. Low confirmed cases, low death rate and moderate recovery rate
2. Moderate confirmed cases, low death rate and high recovery rate
3. High confirmed cases, high death rate and moderate recovery rate

1 . Low confirmed cases, low death rate and moderate recovery rate : The Africa, Central America, and the Asia regions belong to this category. Cases were from a few hundred of thousands to a few million, the death rate also was low at below 5% for all countries and the recovery rate was in the range of 30-40% percent for all regions. This were the least impacted regions in the world, and their response to the outbreak of the disease was effective as the death rate was kept low and the recovery rate was moderate at an average of about 35%

2. Moderate confirmed cases, low death rate and high recovery rate : The Middle East Asia and the East Asia and Oceania regions populate this group of classification. The total number of cases recorded were in their few tens of millions (7-12), but in similarity to the previous group, they surprisingly recorded a very low death rate (2-3%). They had the highest percentage recoveries of all the groups, even with their cases being in the range of tens of millions, the East Asia and Oceania region with the highest value of 66.44% and the Middle East Asia region with a value of 57%. This is a group more impacted by the pandemic in terms of the number of cases but

they handled them with the most effectiveness as the death rate was kept very low to a minimum and the recovery rate was very high.

3. High confirmed cases, high death rate and moderate recovery rate: The North America and the Europe region are found in this category of classification. The total number of cases recorded were in their many tens of millions (40-92), but in contrast to other groups the death rate was very high, 7% in North America, and reaching as high as 11.47% in Europe. The recovery rate was nothing more to be classified as moderate, as values were between over 36% in Europe and over 43% in North America. This is the most impacted by the pandemic in terms of the number of confirmed cases and death rates. As both soared high, and the recovery rate, just moderate showed that this group was not effective in dealing with the pandemic.

4. Identify Regions with the Highest Impact

a. Use the available data to identify the regions (countries or provinces/states) that were most affected by Covid-19 in terms of the confirmed cases and deaths

	Confirmed	Deaths	Recovered	Percent Deaths	Percent Recoveries
Country/Region					
Nigeria	321997	9448	87134	2	27
Japan	948475	37924	487432	3	51
Mainland China	10047149	453792	7906544	4	78
US	84900037	4765164	15449638	5	18
France	11852385	1644423	3574872	13	30
Afghanistan	445077	9163	46369	2	10

The table above shows the trend in cases, deaths and recoveries in 6 countries over the course of six months (January - June 2020)

The table above shows how the pandemic fared in our target countries, countries that were moderately affected and handled the pandemic well, include Nigeria and

Afghanistan, they had low confirmed cases, deaths and a moderate recovery rate. This is probably due to the lack of spread of the pandemic in this countries, and the effectiveness of their less developed healthcare to counter the pandemic.

Another group of countries that distinguishes themselves from the others are countries with a high confirmed cases, very low deaths and a very high percent of recovery. These countries include Japan and China, this was the case case because they were very early adopters of the quarantine and strict lockdown measure, as the pandemic originated in this area. Another reason they might have handled it well will be due to their very advanced health care system, compared to the others

The last group of countries that were very evident on the table for negative reasons are countries with very high number of confirmed cases, a very high death rate and a very low recovery rate. These countries include the US and France. These countries were badly hit with the pandemic, and their healthcare system, even though highly developed were unable to handle the astronomic increase in cases in a short time. This resulted in even a higher rate of infection, death rate and a corresponding decrease in recovery rate. Another reason attributed to these trend is that these countries failed to employ lockdown strategies fast enough, resulting into an explosion of cases their healthcare system could not handle.

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Some other countries too were greatly affected in terms of number of deaths, and the high percent of deaths. The table below shows countries with a really high number of deaths and a high number of death rate

Country/Region	Confirmed	Deaths	Recovered	Percent Deaths	Percent Recoveries
US	84900037	4765164	15449638	5.612676	18.197446
Italy	15399969	2072220	6760057	13.456001	43.896562
UK	13363760	1860786	62165	13.924120	0.465176
Spain	15609455	1708931	8110890	10.948050	51.961391
France	11852385	1644423	3574872	13.874195	30.161626
Belgium	3361168	505460	827421	15.038225	24.617068
Netherlands	2781422	334133	14388	12.013028	0.517289
MS Zaandam	647	142	0	21.947450	0.000000
Yemen	8786	1863	352	21.204188	4.006374
Bahamas	5622	686	2072	12.202063	36.855212

The table above shows the trend in cases, deaths and recoveries in 10 countries over the course of six months (January - June 2020)

The first five countries, from the US to France experienced cases in tens of millions, the US was the worst hit country with over 84 million cases, all these countries also had a high rate of deaths, with almost all the countries having a value of over 10%. This resulted in deaths in millions in these countries, with the US also being the worst hit with over 4 million deaths. The UK was the worst of them all with under one percent of recoveries, as less than 700,000 people had recovered from more than 13,000,000 confirmed cases, and over 1,800,000 had died.

The last 5 countries had a number of total confirmed cases but they stood out due to their alarming death rate. Countries like Belgium and the Netherlands were the worst hit of the group, because of their relatively high number of cases, this spelt a high number of casualty. The other countries in the group had a relatively lower amount of cases, but were also greatly hit, in terms of the percentage of deaths. This is most likely attributed to poor healthcare facilities to handle the disease, as these countries do not seem to be well developed like the others. The other countries even though, with better could not handle the incidence of the spread of the virus well, due to the very high number of cases and the fast spread of the pandemic in these countries.

b. Highlight areas that experienced the most severe outbreaks and compare these with less affected regions

	Confirmed	Deaths	Recovered	Percent Deaths	Percent Recoveries
Africa Region	837707	28576	314806	2.910000	38.880001
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The table above shows the trend in deaths and recoveries in 7 regions over the course of six months (January - June 2020)

The table above shows the incidence of cases in different regions of the world, it shows how the confirmed cases fared with the death and the recovery rates.

There are two regions that stand out distinctively from the table above, they have a very high incidence of the confirmed cases a very high death rate and a very poor recovery rates. These are the Europe and the North American regions. They experienced the most severe of the outbreaks in all the world, and it was not well handled by their existing healthcare system as evidenced by their high death rates. These regions had cases in the tens of millions, with a corresponding high death rate. For example, more than 11% of all confirmed cases died in Europe, with only less than 40% making recoveries. This was due to not adopting strict lockdown restrictions early and a high population.

Another group of regions that follow a trend of the progression of the pandemic, are countries with moderate amount of confirmed cases, a low death rate, and a high recovery rate. These are the Africa, Central America and Asia regions. They experienced the least severe outbreak of the pandemic with cases in the range of a few hundred thousands and a few million, they also handled it well with the death rate

being lower than 5% in all countries and close to 40% making recoveries in all the regions. The good response to the pandemic in these countries is likely due to the low incidence of the diseases in these countries, and so their healthcare sector, though relatively poorer than other regions was able to handle the pandemic moderately well.

The last group of regions that follow of the pandemic during the first 6 months are the countries with a high number of confirmed cases, a low death rate, and a very high recovery rate. These regions include the Middle East Asia and the East Asia and Oceania regions. There were confirmed cases in tens of millions, deaths in just a few thousands (2-3%), and recovery rates in close or higher than millions (56-67%) for both regions. These are the regions that got high very badly but handled the pandemic the best, this can be attributed to some reasons like :

1. Adopting strict lockdown restrictions early, which the countries in the North American regions failed to do,
2. Having a relatively more advanced healthcare than countries in the Africa, Asia and Central America regions, which made them handle the pandemic better

5. Explore the Timing and Effects of Mitigation Strategies

- a. Analyze how the timing of major updates (e.g., when certain regions updated their data or implemented restrictions) might have affected the confirmed cases and deaths

	Africa	North America	Central America	East Asia and Oceania	Europe	Middle East Asia	Asia
Update Days							
Friday	61	1142	159	876	404	55	69
Wednesday	61	1226	177	990	455	63	89
Sunday	58	1327	173	973	461	66	89
Tuesday	54	1242	171	835	405	56	64
Monday	51	1167	159	833	395	50	75
Thursday	51	1141	180	903	392	54	99
Saturday	48	1208	164	863	403	53	58

The table above shows the trend in update days in 7 countries over the course of six months (January - June 2020)

The table above shows the frequency of each day of updates for each region. It shows one of the most common days of the week for updates is Sunday, that is the start of the week. This is one of the best times to make updates as it is a weekend and the start of a new week. More people will come across the news of the update, and will make sure to be more careful as they set out for a new week. It seems most countries in different regions chose to update more on the weekends for this reason, as it is for sure a measure to keep infection rates down.

Another day that was popular updates was Wednesdays, it was popular across all regions as a day of updates, as it was the middle of the week, arguably the next best time to make updates after the start of the week. Information about the pandemic at this time would make people replan their weekend and stay indoors. This was also an effective measure to keep the infection rate down. Some regions like Asia, Central America, East Asia and Oceania also favoured Thursdays in addition to Wednesdays as a preferred day of updates

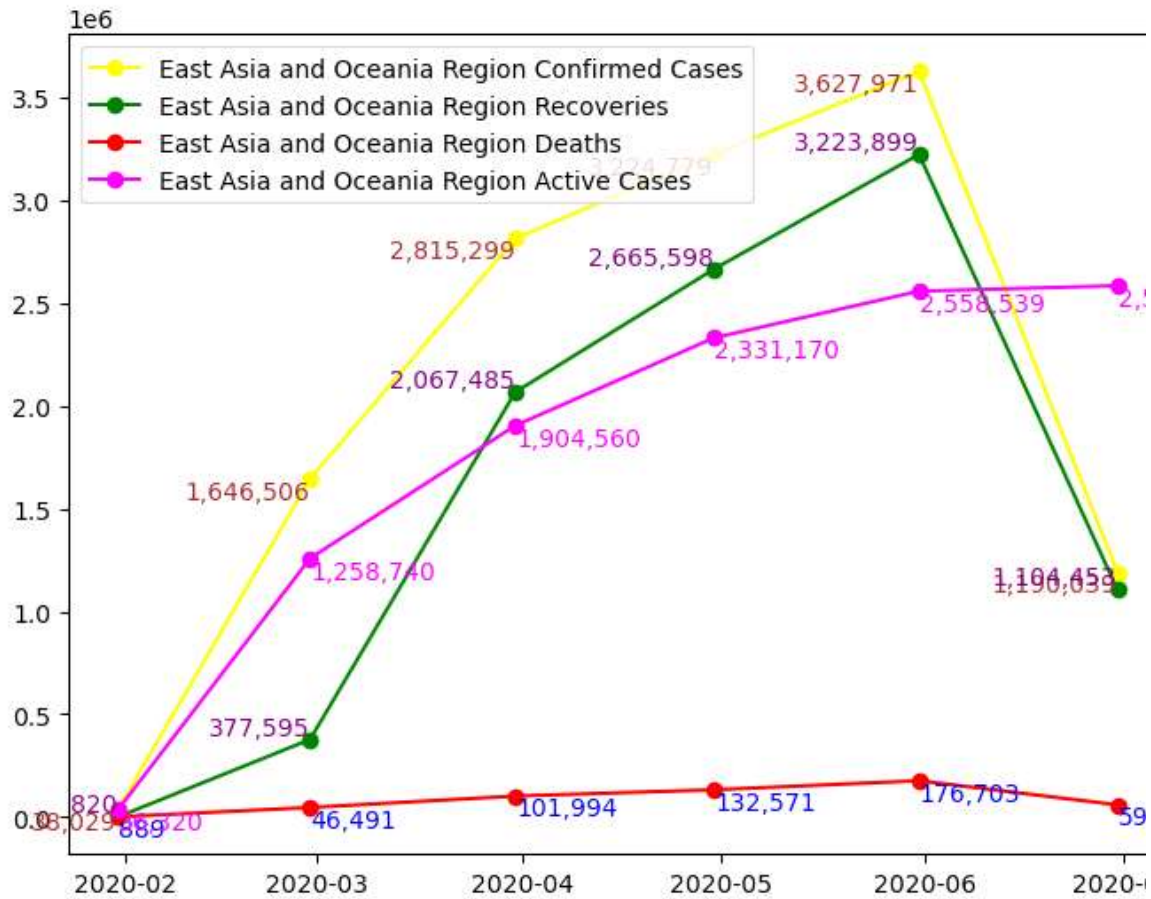
There are however some regions that still had high values and fairly constant updates throughout the week, this can be attributed to high population and high rate of the incidence of the disease. The former can be attributed to the North America region, and the latter, the Europe regions. Both were the two most affected regions, so a high frequency of updates was necessary to keep their citizens informed, and safe from the spread of the disease

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5b. Compare how different regions' responses (lockdowns, healthcare interventions) influenced their confirmed cases, death rates, and recovery rates.

There were early and late adopters of the lockdown and quarantine health interventions, some countries in some regions started quarantine and strict lockdown restrictions as early as Late January and early February 2020. One of those regions is the East Asia and Oceania regions. This region consist of countries like China (The originator of the virus), Japan, South Korea, and Australia. The graph below shows the trend of the graph over the 6 months of data collected

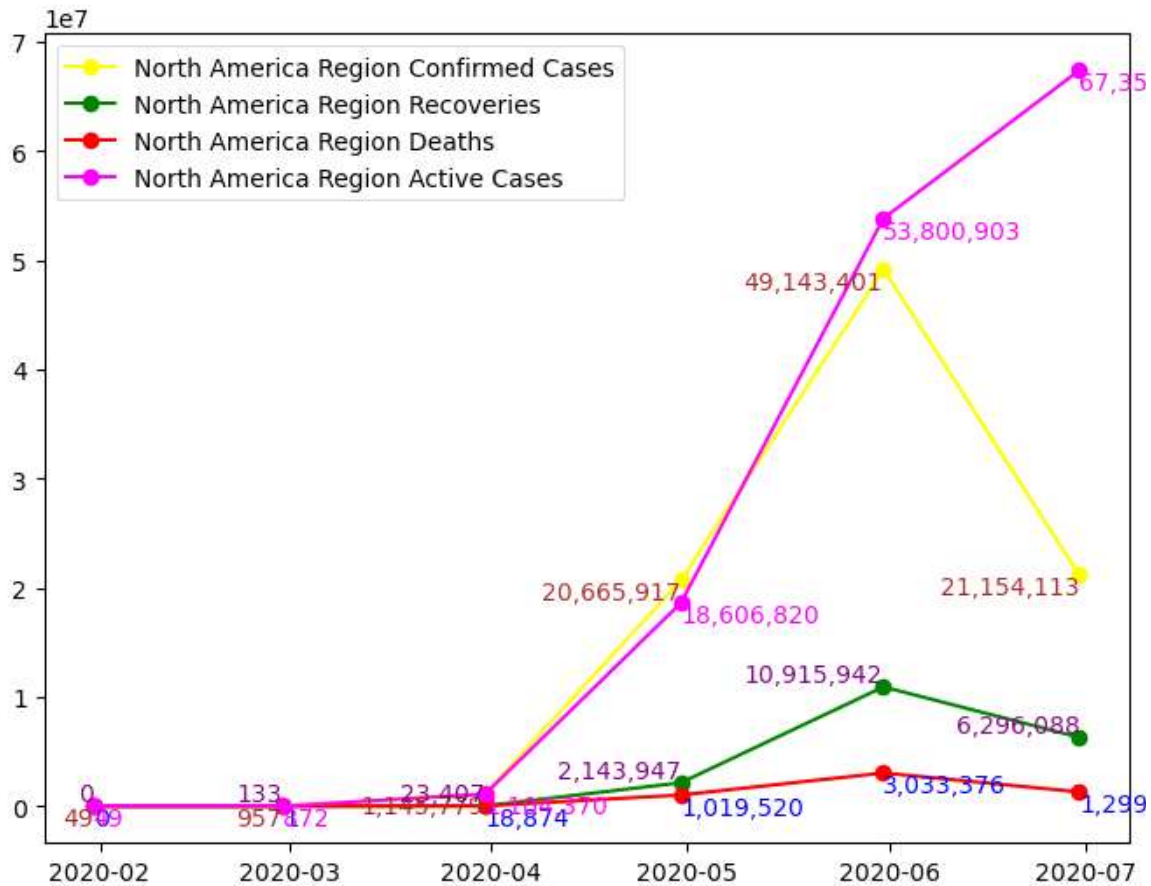


The graph above shows the trend in cases, deaths and recoveries in 6 countries over the course of six months (January - June 2020)

This graph shows a smooth rise of the confirmed cases plot and a contrasting exponential rise of the recoveries plot. In almost all other regions, the reverse of this was the case. The early adoption of quarantine and strict lockdowns enabled the region to combat the spread of the virus. This enabled health care -though advanced, and this might added an extra advantage- to effectively handle the pandemic well. In fact, beginning from the April 2020, this region had more recoveries than there were active cases, this is a show of how effective their lockdown restrictions stalled the rate of new infections, and greatly improved the recovery rate.

On the other hand, there were also late adopters of the lockdown and quarantine health interventions, a good example are countries in the North American region, this includes countries like USA and Canada. These countries are very far from the origin of the virus (East Asia). The graph below shows the trend of the graph over

the 6 months of data collected



The graph above shows the trend in cases, deaths and recoveries in 6 countries over the course of six months (January - June 2020)

The graph shows a low infection rate for the first few months in contrast to the last region. Well, compared to the last region, they encountered the pandemic late, and so they were really lax with the restrictions until there was an explosion of cases in early April 2020. The number of confirmed cases surged and the health care was unable to keep up with the infection rate. This the total number of active cases continued to rise astronomically, while the recovery rate fairly rose and dropped.

